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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,048	10/31/2003	Dieter M. Gruen	S-97957	8384

31970 7590 06/11/2007  
UNITED STATES DEPARTMENT OF ENERGY  
1000 INDEPENDENCE AVENUE, S.W.  
ATTN: GC-62 (CHI), MS 6F-067  
WASHINGTON, DC 20585-0162

EXAMINER
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FICK, ANTHONY D

ART UNIT	PAPER NUMBER
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1753

MAIL DATE	DELIVERY MODE
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06/11/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/697,048	<b>Applicant(s)</b> GRUEN, DIETER M.	
	<b>Examiner</b> Anthony Fick	<b>Art Unit</b> 1753	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 May 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) 27-34 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1-34 are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Election/Restrictions***

1. Applicant's election of group I, claims 1 through 26 in the reply filed on May 2, 2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 27 through 34 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on May 2, 2007.

### ***Specification***

3. The disclosure is objected to because of the following informalities: on page 4 of the specification, applicant is attempting to incorporate by reference copending application 10/398,417. This application is for medicaments, is not by the inventor, and seemingly has nothing to do with doped diamond solar cells. Applicant is advised to confirm the application number or point out why this application is incorporated by reference.

Appropriate correction is required.

### ***Claim Objections***

4. Claims 13 and 25 are objected to because of the following informalities: the claims contain the units atoms/cm<sup>2</sup> while the specification has cm<sup>3</sup>. As the typical units for concentration include a volume, it is assumed applicant meant for the claims to have

cubic centimeters. If not, then the specification needs to be corrected to match the claims. Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 through 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kolawa et al. (U.S. 6,753,469) in view of Gruen et al. (U.S. 6,793,849).

Kolawa discloses a power conversion device as shown in figure 1.

Regarding claims 1 and 16, the device comprises layers of p-doped diamond and n-doped diamond, electrodes connected to each layer, whereby irradiation of the layers produces electron flow.

Regarding claims 4 and 18, Kolawa discloses the p-doped layer can be 5 microns thick (column 5, paragraph 6).

Regarding claims 5, 6, 7, 19 and 20, Kolawa discloses doping the diamond with boron (column 5, paragraph 3).

The differences between the claims and Kolawa are the requirements of specific n-doped diamond layers, and specific p-doped diamond.

Gruen teaches an n-doped ultrananocrystalline diamond or UNCD (abstract).

Regarding claims 8, 11, 12 and 21, Gruen teaches doping the UNCD with nitrogen.

Regarding claims 9, 10, 14, 22, 23 and 26, Gruen teaches the UNCD has average grain sizes between 3 and 15 nanometers (claim 4) and grain boundaries about 0.2 to 2.0 nm wide (claim 3).

Regarding claims 13 and 25, Gruen teaches the UNCD has not less than  $10^{19}$  atom/cm<sup>3</sup> nitrogen with an electrical conductivity of not less than about  $0.1 (\Omega \text{ cm})^{-1}$  (claim 1).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the n-doped UNCD films of Gruen as the n-doped diamond film of Kolawa because the n-doped UNCD is a functional equivalent to ordinary n-doped diamond and thus one would have a reasonable expectation of success from the combination. This functional equivalence is also true for microcrystalline p-doped diamond over ordinary p-doped diamond.

In regards to the thickness of the layers, claims 15 and 24, the choice of layer thickness is dependent on the specific application and it would have been obvious to choose a thickness as within the claims, absent any unexpected results.

### ***Double Patenting***

7. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422

Art Unit: 1753

F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

8. Claims 1 through 26 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 through 28 of U.S. Patent No. 6,793,849 in view of Kolawa et al. (U.S. 6,753,469). U.S. 6,793,849 discloses an n-doped ultrananocrystalline diamond or UNCD film doped with nitrogen (claims 1 and 2). U.S. 6,793,849 discloses the UNCD has average grain sizes between 3 and 15 nanometers (claim 4) and grain boundaries about 0.2 to 2.0 nm wide (claim 3). U.S. 6,793,849 further discloses the UNCD has not less than  $10^{19}$  atom/cm<sup>3</sup> nitrogen with an electrical conductivity of not less than about  $0.1 (\Omega \text{ cm})^{-1}$  (claim 1). The differences between U.S. 6,793,849 and the present invention are the requirements of a conversion device comprising a specific p-doped diamond layer in contact with the UNCD and electrodes.

Kolawa teaches a power conversion device as shown in figure 1. Regarding present claims 1 and 16, the device comprises layers of p-doped diamond and n-doped diamond, electrodes connected to each layer, whereby irradiation of the layers produces electron flow.

Regarding present claims 4 and 18, Kolawa teaches the p-doped layer can be 5 microns thick (column 5, paragraph 6).

Art Unit: 1753

Regarding present claims 5, 6, 7, 19 and 20, Kolawa teaches doping the diamond with boron (column 5, paragraph 3).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the n-doped UNCD films of U.S. 6,793,849 as the n-doped diamond film of Kolawa because the n-doped UNCD is a functional equivalent to ordinary n-doped diamond and thus one would have a reasonable expectation of success from the combination. This functional equivalence is also true for microcrystalline p-doped diamond over ordinary p-doped diamond.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Fick whose telephone number is (571) 272-6393. The examiner can normally be reached on Monday - Friday 7 AM to 4 PM.

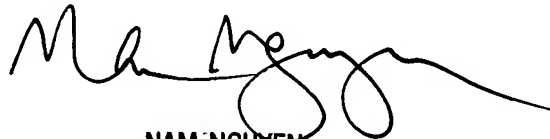
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1753

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Anthony Fick  
AU 1753  
June 6, 2007

*ADF*

  
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SUPERVISORY PATENT EXAMINER  
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